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CONTENTS

TWENTIETH ANNUAL CONFERENCE OF STATE UTILITIES COMMISSION ENGINEERS

The Twentieth Annual Conference of State Utilities Commission Engineers was held at Wardman Park Hotel, Washington, D. C., May 22 and 23, 1942, under the chairmanship of Frederick E. Mindt, rate engineer of the Public Service Commission of New Hampshire. Thirty-six engineers attended as representatives of 23 States, the District of Columbia, and the Province of Quebec. The Federal Government was represented by 10 engineers from 4 regulatory commissions, 2 officials of the War Production Board, and 5 members of the Bureau's staff.

The following papers were presented and discussed during the four regular sessions: Construction and use of actuarial studies in depreciation determination, Martin T. Bennett, New York; Protection of public utility property and service under war conditions, H. J. Flagg, New Jersey; California telephone rate plans for extended service in metropolitan areas, Arthur B. Fry, California (presented by E. F. McNaughton); Comments on the National Electrical Safety Code, fifth edition, P. L. Holland, Maryland; Load factor rates, W. E. Limbocker, Kansas; Regulation of underground cathodic protection, K. H. Logan, National Bureau of Standards; Methods used and problems encountered in conversion from manufactured to natural gas, J. H. Mathews, Illinois (presented by E. R. Weaver); Activities of the communications branch, War Production Board, relating to utility services, Leighton H. Peebles, War Production Board; Special duties and problems of the New Hampshire Commission in war effort, Laurence J. Riis, New Hampshire; Defense impelled utility improvements and the exercise of regulatory authority, Irvine E. Rudd, Connecticut; Allocation of gas properties, H. J. Wagner, West Virginia.

Copies of the papers presented are not available for distribution by the Bu-

[1] Published with approval of the Director of the Budget.

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reau. Requests for copies or inquiries regarding the papers should be sent direct to the authors.

An added feature of special interest was a discussion of power supply as related to war activities in Quebec, by J. R. Desloover. At a dinner meeting on the evening of May 22, Charles F. Kells of the power branch of the War Production Board explained some of the problems arising from shortage of essential materials and how these problems are being met under the preference rating orders of WPB.

The following recommendations submitted by the Policy Committee of the Conference were unanimously adopted: (1) That the next meeting be held at Washington, D. C., under the auspices of the National Bureau of Standards; (2) That the date of the next Conference be fixed by the Executive Committee after consultation with the Bureau of Standards as to its convenience, also having in mind the object of promoting attendance at the Conference; (3) That for the next Conference, engineers of Federal regulatory commissions be invited to attend and participate in the proceedings on the same basis as the engineers of the State commissions.

As members of the Program Committee for the next Conference the following engineers were designated: O. S. Vogel (Georgia), chairman; Martin T. Bennett (New York), C. E. Bryant (North Dakota), J. R. Desloover (Quebec), H. L. Gerrish (Maine), and E. F. McNaughton (California). As members of the Executive Committee in charge of general arrangements, the following were elected: Wayne E. Limbocker (Kansas), Chairman; Geo. P. Steinmetz (Wisconsin), Vice-Chairman; G. W. Clewley (Vermont), John T. Mundy (South Carolina), and E. C. Crittenden (National Bureau of Standards), secretary. As assistant secretary, Richard L. Lloyd has been designated.

CONSTANT OF GRAVITATION

A new determination of the Newtonian constant of gravitation is reported in a paper (RP1480) by Paul R. Heyl, which will be published in the July number of the Journal of Research. The apparatus used was the torsion balance, and the general plan of the work was the same as that published in BS J.Research **5**, 1243 (December 1930) RP256. The method makes use of the change in the time of swing of a torsion pendulum resulting from the presence or absence of large attracting masses in its immediate neighborhood.

A number of improvements in the apparatus were suggested, some of which were tried, and two of which were adopted. The unsuccessful trials are discussed in detail for the benefit of future workers. The two changes adopted were the use of photographic recording of the time of swing in place of visual observations, and a change in the position of the large attracting masses which greatly simplified the length measurements. Two different tungsten filaments were used as a suspension for the pendulum, one hard drawn and one specially annealed and kept straight during the drawing and subsequent handling. Contrary to expectations, it was found that the results with the hard-drawn filament were the more precise. The only advantage of the annealed filament was that it did not require as much time for aging after installation, which, of course, is a factor of importance where time is an object, as in geophysical prospecting for oil.

The final result obtained was:

$$G=6.673\pm0.003\times10^{-8}\text{cm}^3\text{g}^{-1}\text{sec}^{-2}.$$

As compared with the 1930 result of $6.670\pm0.005\times10^{-8}$, it will be seen that the increase in precision is hardly appreciable. It may therefore be concluded that the limiting point of diminishing returns has been reached with this form of apparatus.

FLOW OF WATER IN OPEN CHANNELS

In problems involving the computation of the flow of water in open channels, the fact that the velocity is not the same at all points of any lateral cross section of the stream leads to the introduction of a "velocity-distribution coefficient" in the flow equation. Two different methods of computing this coefficient have been given in the past, leading to slightly different forms of the equation. One of these methods was developed by Coriolis and involved averaging the cubes of the local velocities. The second method of computing the velocity-distribution coefficient was due to Boussinesq and involved averaging the squares of the local velocities. A controversy has existed over this discrepancy in the flow equations for more than half a century without any satisfactory explanation of the difficulty. Coriolis' point of view has generally prevailed, however.

In the July Journal of Research (RP 1488), G. H. Keulegan shows that there are two methods of deriving the equation for turbulent flow in open channels. Both are based on the fundamental equa-

tions of hydrodynamics, but the methods of derivation proceed by somewhat different paths, although having the same starting point. In one of the methods the terms in the equation that is integrated have the dimension of rate of change of energy. This will be called the "energy method." In the other method, the terms have the dimension of rate-of-change of momentum. This will be called the "momentum method."

In the final flow equations derived by each of these two methods, certain terms occur which can be combined to form a single term containing a so-called friction coefficient. It is found that in the equation derived by the energy method, this "friction coefficient" is actually related to the rate of energy dissipation in the water and that the velocity-distribution coefficient has the form of the Coriolis coefficient. On the other hand, in the equation derived by the momentum method, the friction coefficient is directly related to the wall friction, and the velocity-distribution coefficient has the form of the Boussinesq coefficient.

Thus it appears that it is correct to use either the Coriolis or the Boussinesq coefficient, providing the proper interpretation is placed on the friction coefficient in the equation. Practically, however, it is preferable to use the equation derived by the momentum method.

PROTECTION OF RADIUM DURING AIR RAIDS

Since the involvement of this country in the present war, numerous requests have been received for information on the safe storage of radium during air raids. The Bureau has standardized nearly all the radium sold in this country during the past 30 years, so it is natural that users of this material should turn to it for adequate information on the protection of individuals from the effects of dispersal of radium by bomb explosions.

As a result of these requests, the following committee was appointed to draft recommendations: L. F. Curtiss, National Bureau of Standards, chairman; Dr. G. Failla, Memorial Hospital, New York, N. Y.; Dr. John E. Rose, Tumor Clinic, U. S. Marine Hospital, Baltimore, Md.; Dr. Curtis F. Burnam, 1418 Eutaw Place, Baltimore, Md.; Dr. Harrison S. Martland, Newark City Hospital, Newark, N. J.; Prof. George B. Pegram, Columbia University, New York, N. Y.; and Sherwood Smith, War Department, Washington, D. C.

This committee has prepared Handbook H38, giving suggestions for storage of the various types of preparations in common use. The suggested procedures aim at a reasonable degree of protection with a minimum interference with the use of the radium. The availability of materials and their cost were also given full consideration in the selection of methods.

If these recommendations are followed, the committee believes there will be little chance of injury to individuals from radium scattered as the result of bomb explosions, even in the rare case of a direct hit on the storage chamber. Since the probability of air raids is greatest near the coast, the Committee advises all users of radium within 500 miles of any coast line to give special consideration to the problem.

Although protection for the more common types of preparations is discussed in the Handbook, the Committee realizes that exceptional situations may exist, and offers to give consideration to these cases on request. Correspondence should be addressed to the Radioactivity Section, National Bureau of Standards.

Copies of H38 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

AUSTENITIC GRAIN SIZE IN STEELS

Steel may be hardened or softened by heating to certain high temperatures and then cooling either rapidly or slowly. The grain size established in the steel at these high temperatures (the austenitic grain size) often has a decided effect upon certain properties of the steel. It is important, therefore, to know the effect of different variables upon the grain size at heat-treating temperatures.

Thomas G. Digges and Samuel J. Rosenberg of the Bureau's Metallurgy Division recently completed a study of the influence of different initial structures and of different rates of heating upon the austenitic grain size at 1,475° and 1,600° F of an iron-carbon alloy and two commercial steels containing 0.5 percent of carbon. As reported in the July Journal of Research (RP1481), they found that the initial structure had but a minor influence upon the grain size of either the iron-carbon alloy or the steels. The rate of heating had a very pronounced effect upon the grain size of the iron-carbon alloy, rapid rates causing the formation of rather small grains, whereas slow rates resulted in the formation of extremely coarse grains. The rate of heating had but a slight effect upon the grain size of the steels, but when such an effect did exist it was

opposite to that found in the iron-carbon alloy in that the finest grains were produced with slow rates of heating.

HARDNESS OF STEEL PLATES

It is generally agreed that moderate cold-rolling of steel causes increases in its indentation hardness. This conclusion is based on results of indentation hardness tests which take into account the over-all effect of cold working of the metal. However, during moderate cold-rolling, the behavior of the metal at and near the surface (commonly designated surface layer) may differ from that of the metal more remote from the surface. Since the structure of the surface layer has been shown to be affected to different degrees by different mechanical surfacing treatments, it appears that the manner of surface finishing a metal prior to rolling may influence the behavior of the surface layer during light cold-rolling.

In cooperation with the Bureau of Engraving and Printing, Harry K. Herschman is studying the influence of surface finishes on the response of 0.34-percent-carbon steel plates to incising processes common to the engraving art. The hardness of the plates at and near the surface, is one of the factors believed to have an important bearing on the response of the steel to these incising operations. Exploratory indentation hardness tests made on a plate which had been burnished by light cold-rolling indicated a "softening" of the metal immediately adjacent to the surface. This prompted a more systematic investigation of the indentation hardness of the surface layer after different degrees of cold-rolling. The steel prior to rolling was finished by three different methods, grinding, buffing, and polishing. Indentation hardness tests were made with an elongated pyramidal diamond (Knoop) indenter and with the Rockwell superficial hardness machine.

As set forth in RP1484 in the Journal of Research for July, the results of tests with the Knoop indenter, using light loads (50 to 200 grams) on the indenter, showed that the hardness of the metal in the immediate vicinity of the surface, as distinguished from the underlying metal, was lower after cold-rolling reductions of 1 and 2 percent than it was prior to rolling. These results suggest that the most significant decreases in hardness occurred in a surface layer less than 0.0003 inch thick. Indentations made with the Knoop indenter under relatively heavy loads (1,000 and 2,000 grams) and with the Rockwell superficial machine were too deep to detect hardness changes in the superficial layer. The test data suggest that the magnitude of the indentation hardness changes in the surface layer of the steel in the prerolled and rolled conditions was influenced by the nature of the initial surface finishing treatment.

SPECIFIC HEAT OF THE SYNTHETIC RUBBER, HYCAR O. R.

Knowledge of the basic thermodynamic constants of two substances permits a calculation of the equilibrium constant in chemical reactions involving the formation of one from the other. Previous work of this sort has been carried out at the Bureau to obtain information about the polymerization reaction of isoprene to form rubber, and its reverse, the decomposition of rubber to give isoprene.

Similar data concerning synthetic rubber have recently become of increased importance. Research Paper RP1487 by Norman Bekkedahl and Russell B. Scott in the July issue of the Journal of Research reports the first measurements necessary for evaluating the thermodynamic constants of the synthetic rubber, Hycar O. R. The specific heat of this material has been measured or evaluated from the absolute zero of temperature to about 70° C. The specific heat at 25° C was found to be 1.971 international joules/degree gram. It was not found possible to crystallize or melt the material, but a second-order transition, one which involves no appreciable absorption or evolution of heat, was found at about —23° C. A similar transition in natural rubber occurs at about —70°. It would appear that below the temperature of its second-order transition a material is brittle and relatively inextensible.

The increase in entropy resulting from heating from the absolute zero of temperature to 25° C was calculated from the specific heat data to be 1.743 international joules/degree gram.

MICROSCOPIC STRUCTURE OF FLAX

With the loss of European sources of supply of flax fiber, a renewed interest in all aspects of the flax problem has been manifested, and accordingly, an investigation of the microscopic structures of flax and related bast fibers was undertaken as a research project of the Textile Foundation at the Bureau. A report on this work by Charles W. Hock will be published as RP1482 in the July Journal of Research.

The stem of the flax plant consists of two main parts, a central woody core, and a surrounding cortex which contains the bast fibers. The cambium layer lies between these regions. Retting, which is one of the procedures carried out during the freeing of the fibers from the stem, involves essentially a softening of the tissues, usually by bacterial action, to permit separation of the fibers from the other parts of the stem. The cambium layer is attacked first during this treatment, followed later by attack on other thin-walled cells in the cortex.

Flax fibers are obtained from the stem in the form of long filaments which vary in length from several inches to more than a yard. Each fiber is made up of cells, which are usually about one inch long and one one-thousandth of an inch in diameter. Other bast fibers such as hemp, jute, and ramie have a similar origin and structure. Although the bast fibers have many structural details like those in cotton, they differ from it in one important respect. Whereas a cotton fiber is a single plant cell, a bast fiber is made up of a group of cells.

A flax cell has a primary and a secondary wall. The former constitutes the surface of each cell and consists largely of wax and other material, much of which has generally been assumed to be of a pectic nature. The secondary wall, which comprises the bulk of the fiber, is made up of innumerable cellulose fibrils, the outermost layer of which winds in one direction, whereas the majority of the fibrils beneath this layer wind in the opposite direction. These fibrils, which are similar to those found in many other plant cell walls, are grouped so as to give the wall a layered pattern. There is a greater number of these layers in the walls of the flax cells at the base of the stem than in the cells from the growing tip. A corresponding increase in thickness of the wall, from the tip of the stem where the cells originate to the base where they mature, also prevails. All the bast fibers have essentially similar structures. Flax and ramie, however, differ from hemp and jute in the directions of fibrillar orientation, and this accounts for some of the differences in the physical properties of the two groups.

ELASTICITY OF WOOL

Wool is of particular value in those branches of the textile industry that manufacture apparel, fabrics, blankets, carpets, and felts—commodities which are important because of their warmth or their elasticity; that is, their ability to regain their original lengths or shapes after they have been distorted. Actually, this elasticity is primarily responsible for the warmth of wool, in that it allows the fabric to maintain a porous structure. The small air spaces in such a structure impart to the fabric its insulating properties. Thus a cotton blanket would be as warm as wool if, instead of matting together in use, it would maintain a porous structure as does a woolen blanket.

The basis of the elasticity of wool has been extensively investigated by Research Associates of the Textile Foundation stationed at the Bureau. In the July Journal of Research (RP1486) Milton Harris, Louis R. Mizell, and Lyman Fourt state that wool apparently owes its elasticity to a rubberlike molecular structure, the molecules being distinguished by their freedom to assume various shapes. This is in contrast to most of the other common fibers, which resemble bundles of closely packed extended strings, each string representing a long molecular chain.

When these stringlike fibers are distorted very much, the long chains move into new positions with respect to each other. Since, in a fiber such as cotton, the new positions are similar to the old, the fiber does not return to its original shape. The ease with which this can occur is one of the principal reasons why cotton and similar materials crease so readily. The molecules of wool fibers would also slide past one another and permanent distortion would be produced if they were not connected at intervals by short cross chains which produce a three-dimensional or network structure. Thus when wool is stretched or folded, the chains do not slide permanently out of position: rather, tensions are set up which cause the fiber to return to its original shape after the removal of the external force.

It is of interest to note that the function of the cross-chains in wool is very similar to that of the cross chains which are presumably formed during the vulcanization of rubber. Indeed, the similarities between these materials are so striking that wool may in a sense be considered to be a vulcanized fiber, in which respect it differs from all other textile fibers.

FLEXURAL FATIGUE OF TEXTILES

The ability of textile fabrics to withstand repeated folding is of practical importance for many uses. It depends not only on the properties of the fibers used in the textile but also on the arrangement of the fibers in the yarns and

of the yarns in the fabric. The influence of fiber, yarn, and fabric structure on the folding endurance of textiles is discussed by Herbert F. Schiefer and Paul M. Boyland in RP1485 in the Journal of Research for July.

ACCELERATED AGING OF LACE LEATHERS

For a number of years, a study of the accelerated aging of leather has been in progress at the Bureau. In the course of this study, a method for aging leather was developed which gives results correlating with those obtained under normal aging conditions. The purpose of developing an accelerated test for leather was to obtain a more direct method of determining its aging characteristics, to save time in testing, and to simplify specifications. Recently while in the course of revising the Federal specification for lace leather, alum-, indian-, and chrome-tanned samples were submitted by various manufacturers. These leathers were tested by the physical and chemical methods described in the Federal Specifications and in addition were subjected to an accelerated aging test.

The results given in RP1483 by Joseph R. Kanagy and Philip E. Tobias in the July Journal of Research indicated that the alum-tanned lace leathers were much less resistant to accelerated aging than the indian-, and chrome-tanned leathers. The indian-tanned lace leathers which were penetrated with vegetable tannins were most stable to the aging treatment. Apparently, measurements of physical properties such as strength, stretch, and flexibility, together with an accelerated aging test may be expected to give more valuable information relative to the performance characteristics of lace leathers than the measurements required by the present Federal specification.

SUMMARY OF DATA ON SOIL CORROSION

Letter Circular LC689, which was prepared a short time ago by Kirk H. Logan, chief of the Bureau's Underground Corrosion Section, is a summary and restatement of observations relating to corrosion of buried metals that have been presented in the Bureau's own publications and in the technical press.

Since underground corrosion is the result of a wide variety of forces, an accurate prediction of the performance of an individual piece of metal is not to be expected. However, the average performance of an adequate number of specimens of a metal under specified conditions can be roughly predicted.

Differences of potential, which are the chief causes of underground corrosion, may originate in differences in the metal and soil, or in conditions incidental to the manner in which a pipe line or other metal structure is installed. Some of the causes of corrosion can be readily recognized and avoided; others may not be easily recognized, or may be unavoidable though known.

Requests for copies of LC689 should be sent to K. H. Logan, National Bureau of Standards, Washington, D. C.

WATER PERMEABILITY OF WALLS BUILT OF MASONRY UNITS

Masonry walls usually perform well the functions for which they were built, including protection from the weather. However, they may be penetrated by wind-driven rain with possible damage to the interior, and the resistance to rain penetration of walls built of masonry units is therefore of importance to the home owner and the builder.

The water permeability of different kinds of small experimental walls built of masonry units has been determined by testing specimens under conditions which produced the effects of a wind-driven rain. The most important factors affecting permeability were the extent to which the interior vertical joints were filled with mortar, the brick-suction or tendency of the bricks to absorb water when laid, and the water-retentivity of the mortar.

The least permeable brick walls were built by filling the vertical joints with mortar or with grout, and by wetting medium- to high-absorptive bricks before placing them in the faces of the walls. Cement-lime mortars of high water retentivity contained limes of high plasticity, and such mortars were used in building the least permeable walls. The mason also experienced less trouble when laying bricks with such mortars than was found for mortars of a relatively low water retentivity.

The complete account of this work has been published as Building Materials and Structures Report BMS82, copies of which are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 20 cents.

SURVEY OF ROOFING MATERIALS IN THE SOUTH CENTRAL STATES

Building Materials and Structures Report BMS84, which has just been released, describes a survey of the weath-

ering qualities and extent of use of various roofing materials on dwellings in the South Central States, with numerous references to similar reports on surveys in the Southeastern, Northeastern, and North Central States.

Detailed studies are reported of roofing materials in Chattanooga and Memphis, Tenn.; Jackson, Miss.; New Orleans, La.; Houston, Dallas, San Antonio, and Amarillo, Texas; Oklahoma City, Okla.; Little Rock, Ark., and Louisville, Ky.

A tabulation by States of the kinds of roofing materials used on 9,500 rural and small-town dwellings, along approximately 4,200 miles of highway between the cities listed above, is included; also a summary of the kinds of roofing materials used on more than 38,000 rural and small town dwellings along approximately 11,000 miles of highway in the 37 States covered by the four surveys.

Forty-eight photographs, illustrating types of weathering of roofing materials, and features of the design and construction of roofs, are shown.

Copies of this report are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 15 cents each.

LEAD-BASE SOLDERED JOINTS IN COPPER TUBING

The use of copper pipe for domestic plumbing lines and certain other purposes was greatly retarded until the development of a satisfactory soldered joint made thin-walled hard-drawn copper tubing practicable for such service. Recently, as part of a general program sponsored by the Copper and Brass Research Association, the merits of tin-base soft solder for these joints were studied and a favorable report was issued (BMS58). However, it was found necessary to recommend that the use of the soldered joints be limited to service in which the prevailing temperatures did not exceed 250° F. Supplementing this early work, a study has just been completed on similar joints made by the use of lead-base solders. An important aim in this work, which is described in detail in Building Materials and Structures Report BMS83, was to find a solder that could be recommended for use at temperatures higher than 250° F. The desire to replace tin by a metal more easily obtained also was a vital consideration.

Joints made with lead-base solders of the following types were tested: Lead-silver, lead-cadmium, lead-tin-antimony, high lead-low tin, and high-purity lead. Specimens made by joining two short pieces of copper tubing by a soldered sleeve coupling were tested at temperatures ranging from room temperature to 325° F., the joint being maintained under tensile loading for very long periods. The information obtained from a simple short-time laboratory test at room temperature is not adequate to permit a proper evaluation of the durability of a joint, hence the need for a "long-time" test carried out at the temperature expected in service.

A joint in copper made with tin-alloy soft solders and maintained at an elevated temperature for a very long time may suffer deterioration of the bond between the copper and solder film. Alloying by diffusion between the tin of the solder and the copper base accounts for this deleterious change. As a result, the solder film in the joint loses ductility and the strength of the assembled joint is lowered. It was largely for this reason that it was considered necessary for joints made with tin-base solder to set a temperature which must not be exceeded in service. At temperatures below 250° F., the adverse change in the joint is so slight as to be negligible.

Joints made with the lead-base solders listed were found to have strengths considerably higher at 250° F. and slightly higher at 325° F. than did joints made with (50–50) tin-lead solder. Deterioration of the bond was not observed in lead-base solders free from tin. Of the different lead-base solders used, lead-silver is most practicable from most standpoints. A solder containing lead and silver in the ratio 96:4 is probably the best "all round" soft solder of this class. The technique of its application, however, is not nearly so simple and easy as is the application of common (50–50) tin-lead solder.

Copies of BMS83 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 10 cents.

FIELD INSPECTORS' CHECK LIST FOR BUILDING CONSTRUCTION

The latest Building Materials and Structures Report (BMS81), released last month, and entitled "Field Inspectors' Check List for Building Construction," was prepared by the subcommittee on structure of the Central Housing Committee on Research, Design, and Construction.

It is intended to be used as a guide and daily reminder to field inspectors on building construction projects and is in no sense a specification outline. In the preparation of the report the committee of representatives of Federal agencies active in the building field had

the benefit of the experience of its members and consultants, supplemented by data from technical reports.

The list is set up in practical form in that it outlines the progress of the work by stages rather than by trades. As a result, the inspector can follow the course of erection day by day in its proper sequence without consulting an index to locate information on specific phases of the project. Each successive stage is clearly indicated, and further details on special items are given in the appendixes.

Copies of BMS81 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 20 cents.

SIMPLIFIED PRACTICE RECOMMENDATION FOR STEEL REINFORCING BARS

Simplified Practice Recommendation R26–42, Steel Reinforcing Bars, promulgated as of June 15, 1942, is a revision of the simplified schedule approved by the industry in 1930. The use of the ½-inch square bar has been dispensed with for the duration of the war. The industry, the War Production Board, as well as the Board's Technical Committee on Concrete Reinforcing Steel, which is advisory to the National Emergency Steel Specifications Committee, are in accord on this action. The Bureau has, therefore, notified all acceptors of record concerning this emergency revision. Until the printed issue is available, information on the subject may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

COMMERCIAL STANDARD FOR OIL-BURNING SPACE HEATERS

The latest Commercial Standard, CS101–43, is entitled "Flue Connected Oil Burning Space Heaters Equipped with Vaporizing Pot Type Burners."

This voluntary standard records specific requirements for design, construction, accessories, fittings, performance, operating efficiency, methods of test, informative labeling, including conformity with the standard, the wording for guarantee from seller to buyer, and suggestions for field tests of installed heaters.

For the first time purchasers will be provided with a definite basis for checking and comparing the construction, performance and operating efficiency of space heaters. It is expected that the wide use of labels evidencing compliance with the standard will result in a decided improvement in the quality and performance of oil-burning space heaters.

The standard will become effective for new production on January 1, 1943. Copies are available from the Superintendent of Documents, Washington, D. C., at 10 cents each.

COMMERCIAL STANDARD FOR GAS FLOOR FURNACES

Gas Floor Furnaces—Gravity Circulating Type is the title of Commercial Standard CS99–42, which has just been released.

This voluntary standard records definitions, appliance construction requirements, sizing, placement, general installation requirements, venting, gas connections, guarantee, certification and labeling of gravity circulating type gas floor furnaces. Its chief purpose is to establish minimum specifications for the guidance of manufacturers, distributors, and users, with particular reference to sizing and installation requirements; to avoid delays and misunderstandings; to record the sizes generally available; and to provide a uniform basis for guaranteeing compliance by the use of labels or certificates.

Through the establishment of the standard and the use of guarantees of compliance issued by the manufacturer and by the installer, the consumer should receive improved performance, a higher degree of safety and greater satisfaction. The standard will also provide a basis for conservation of materials and labor in the sense that both the purchaser and the War Production Board will have means for distinguishing between gas floor furnaces which will perform satisfactorily and those which are poorly constructed, even dangerous, and might have to be replaced after a short period. The standard became effective for new production on May 25, 1942. Copies are available from the Superintendent of Documents at 5 cents each.

SIMPLIFIED PRACTICE RECOMMENDATION FOR STOVE PIPE

Simplified Practice Recommendation R190–42, Stove Pipe and Accessories, was developed for and in cooperation with the War Production Board's Plumbing and Heating Branch with a view to conserving materials and manpower. It lists sizes, gages, and finish for joints, elbows, and reducers. The line of stove pipe and acessories has been simplified primarily by the elimination of certain

gages of metal. Only two gages, Nos. 28 and 30 (U. S. Standard), are retained in the recommendation, four having been discontinued. According to available data, this program effects a reduction of approximately two-thirds of the 209 items which the industry has been producing for general use.

The War Prodution Board has tentatively accepted the recommendation as the basis for a schedule to Limitation Order No. L–42, which covers plumbing and heating materials. After the emergency, this program will be maintained as a voluntary simplified practice recommendation, and any necessary revisions can then be made. Mimeographed copies of R190–42 are obtainable on application to the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

COMMERCIAL STANDARD FOR MULTIPLE-COATED, PORCELAIN-ENAMELED STEEL UTENSILS

Commercial Standard CS100–42, entitled "Multiple-Coated, Porcelain-Enameled Steel Utensils", has just been released. This standard records requirements for enameled utensils for cooking, household, food storage and hospital use, including specific limitations on impact resistance, solubility and acid resistance, resistance to thermal-shock, requirements and tolerances for capacity, dimensions, and thickness of base metal. Detail methods of tests for determining compliance with the standard and requirements for the wording of a label to be used by manufacturers and distributors in guaranteeing compliance with the standard for the protection and guidance of the purchaser, are included.

The standard will become effective for new production on September 30, 1942. Copies are available from the Superintendent of Documents, Washington, D. C. The price is 5 cents.

SIMPLIFIED PRACTICE RECOMMENDATION FOR CRAYONS, CHALKS, AND MODELING CLAYS

Simplified Practice Recommendation R192–42, "Crayons, Chalks, and Modeling Clays for School Use (Types, Sizes, and Packaging)", which became effective on May 15, 1942, covers types, sizes, and packaging of drawing crayons, pastels, and chalks (dustless, molded, colored, and lecturers') also colors and packaging of modeling clays.

This simplification program discontinues entirely the use of all types of metal containers; eliminates more than 40 kinds of packaging, certain varieties of crayons, chalk, and modeling clay; and reduces the number of different ink-colors used in decorating containers. Adherence to it should make possible the avoidance of bottlenecks in inventories in the hands of manufacturers and distributors, and should not only save metal by substituting paper and paperboard as packaging materials, but also conserve paper and paperboard themselves.

Until the printed recommendation is available, free mimeographed copies may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

NEW AND REVISED PUBLICATIONS ISSUED DURING JUNE 1942

Journal of Research [2]

Journal of Research of the National Bureau of Standards, volume 28, number 6, June 1942 (RP1473 to RP1479, inclusive). Price 30 cents. Annual subscription, 12 issues, $3.50.

Research Papers [2]

[Reprints from March and April 1942 Journal of Research]

RP1460. Soil-corrosion studies, 1939: Ferrous and nonferrous corrosion-resistant materials. Kirk H. Logan. Price 10 cents.

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RECENT BUREAU ARTICLES APPEARING IN OUTSIDE PUBLICATIONS [3]

Refinement in design to conserve materials. William R. Osgood. Engineering News Record (330 West 42d St., New York, N. Y.) 128, no. 17, 58 (April 23, 1942).

Comparison between the observed density of crystalline rubber and the density calculated from X-ray data. W. Harold Smith and N. P. Hanna. Rubber Chemistry and Technology (1500 Greenmount Ave., Baltimore, Md.) 15, No. 2, 265 (April 1942).

Fatigue tests as a means of evaluating corrosion damage. W. H. Mutchler and J. A. Kies. Preprint 30, Am. Soc. Testing Materials (260 South Broad St., Philadelphia, Pa.) (May 1942).

Influence of the combination of principal stresses in fatigue of metals. D. J. McAdam, Jr. Preprint 32, Am. Soc. Testing Materials (May 1942).

[2] See footnote on page 57.

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